

WHAT IS CLAIMED IS:

1. A method for estimating retransmission timeout (RTO_j) used in a communication system to support multiple retransmission of the same packet between a server

and a client, the method comprising the steps of:

(a) transmitting a plurality of data packets from said server to said client;

(b) transmitting a negative acknowledgment (NACK) packet for retransmission by said client if one of said data packets is missing;

(c) computing a round-trip delay (RTT_i) corresponding to a latency between sending said NACK packet to said server and receiving the corresponding retransmission of said missing packet from said server;

(d) calculating a plurality samples of delay (\square_j) between the reception adjacent packets of said plurality of data packets by said client;

(e) determining a smoothed inter-packet delay variance ($SVAR\square_j$) based on said calculated delay samples; and,

(f) computing said RTO_j based on said determined RTT_i and said determined smoothed inter-packet delay variance.

2. The method of claim 1, further comprising the step of controlling retransmission of said NACK based on said computed RTO_j , said computed RTO_j being a delay between subsequent transmissions of said NACK packet from said client to said server.

3. The method of claim 1, wherein said $SVAR_{\square_j}$ is determined according to

$$SVAR_{\square_j} = (1 - \square_1) * SVAR_{\square_{j-1}} + \square_1 * D,$$

wherein \square_1 being set to 0.25 and D being the absolute difference of $\square_j - SVAR_{\square_{j-1}}$.

5 4. The method of claim 1, wherein said RTO_j is determined according to

$$RTO_j = n * RTT_i + m * SVAR_{\square_j},$$

wherein n being set between 0 and 4 and m being set to $m = 4.2792 * n - 2.6646$.

10 5. The method of claim 1, wherein the communication link between said server and said client comprises at least one of a wireless communications link, a wired communication link, and the combination of a wired communication link and a wireless communications link.

15 6. A method for managing transmission of a plurality of data packets over a communications link between a server system and a client system; the method comprising the steps of:

(a) transmitting a plurality of burst packets from said server to said client;

(b) transmitting a negative acknowledgment (NACK) packet for retransmission by said client if one of said burst packets is lost;

20 (c) determining a round-trip delay (RTT_i) corresponding to the actual time between the transmitting said NACK packet by said client and a determination by said client said lost burst packets was transmitted successfully;

(d) calculating a plurality samples of inter-burst delay (\square_j) between the reception of adjacent burst packets of said plurality of burst packets by said client;

(e) determining a smoothed inter-burst delay variance ($SVAR\square_j$) based on said calculated inter-burst delay samples; and,

5 (f) computing said RTO_j based on said determined RTT_i and said determined smoothed inter-burst delay variance.

7. The method of claim 6, further comprising the step of controlling multiple retransmission of said NACK based on said computed RTO_j , said computed RTO_j being a delay
10 between subsequent transmissions of said NACK packet from said client to said server.

8. The method of claim 6, wherein said $SVAR\square_j$ is determined according to
 $SVAR\square_j = (1 - \square_1) * SVAR\square_{j-1} + \square_1 * D$,

wherein \square_1 being set to 0.25 and D being the absolute difference of $\square_j - SVAR\square_{j-1}$

9. The method of claim 6, wherein said RTO_j is determined according to

$$RTO_j = n * RTT_i + m * SVAR\square_j,$$

wherein n being set between 1 and 4 and m being set to $m = 4.2792 * n - 2.6646$.

20 10. The method of claim 6, wherein said communication link between said server and said client comprises at least one of a wireless communications link, a wired communication link, and the combination of a wired communication link and a wireless

communications link.

11. A system for estimating retransmission timeout (*RTO*) used in a communication system to support multiple retransmission of the same packet between a server system and a client system, comprising:

means for controlling said multiple retransmissions of a data packet between said server system and said client system over said communication link based on an actual around-trip delay (*RTT*) and a smoothed inter-packet delay variance (*SVAR* _{\square_j}) associated with said client system, said *RTT* being a latency between sending a negative acknowledgment (*NACK*) packet to said server system responsive to a lost packet and receiving the corresponding retransmission of said lost packet from said server, said smoothed inter-packet delay variance (*SVAR* _{\square_j}) being variation of delays before and after each received packet or burst of packets, whereby the over-estimation and under-estimation of said *RTO* is relatively minimized.

12. A system for managing transmission of a plurality of data packets over a communications link between a server system and a client system, comprising:

means for receiving said data packets in the form of frame comprised of packets;

means for determining whether any frame packets were lost during transmission;

means for requesting that any lost frame packets be retransmitted;

means for determining a round-trip delay (*RTT* _{i}) corresponding to a latency between requesting retransmission of said lost frame to said server and receiving the corresponding retransmission of said lost frame from said server;

means for determining inter-burst packet delay variations; and,

means for determining a retransmission timeout (RTO_j) based on said determined RTT and said determined inter-burst delay variations.

5 13. The system of claim 12, wherein said means for determining said RTO_j further comprises a means for determining an inter-burst delay (\square_j) between the reception of a first packet of said lost burst packets and a last packet of a prior burst packets; and, a means for determining a smoothed inter-burst delay variance ($SVAR\square_j$),

10 14. The system of claim 12, further comprising a means for controlling multiple retransmission of said NACK based on said computed RTO_j , said computed RTO_j being a delay transmission of said NACK packet from said client to said server.

15 15. The system of claim 12, wherein said $SVAR\square_j$ is determined according to

$$SVAR\square_j = (1 - \square_1) * SVAR\square_{j-1} + \square_1 * D,$$

wherein \square_1 being set to 0.25 and D being the absolute value of $\square_j - SVAR\square_{j-1}$.

16. The system of claim 12, wherein said RTO_j is determined according to

$$RTO_j = n * RTT_i + m * SVAR\square_j,$$

20 wherein n being set between 1 and 4 and m being set to $m = 4.2792 * n - 2.6646$.